REVISTA BRASILEIRA DE ZOOLOGIA

Revta bras. Zool., S Paulo 3(1): 7-25 28.vi.1985

NEW GENERA AND NEW SPECIES OF NASUTITERMITINAE FROM THE NEOTROPICAL REGION (ISOPTERA, TERMITIDAE)

LUIZ ROBERTO FONTES

ABSTRACT

Three new Neotropical genera of Nasutitermitinae, of the group with mandibulate soldiers, are described. Cyrilliotermes, *gen. n., is related to* Curvitermes *and includes* C. cupim, *sp. n. (type species),* C. jaci, *sp. n.,* C. cashassa, *sp. n.,* C. strictinasus *(Mathews, 1977), comb. n., and* C. angulariceps *(Mathews, 1977), comb. n., both* C. strictinasus *and* C. angulariceps *being removed from* Curvitermes. *Alates and soldiers are described for* C. cupim, *from Brazil, and for* C. cachassa, *from Suriname, and soldiers for* C. jaci, *from Suriname; a new locality is reported for* C. strictinasus. Embiratermes, *gen. n., is related to* Armitermes *and include* E. festivellus *(Silvestri, 1901), comb. n. (type species),* E. benjamini *(Snyder, 1926), comb. n.,* E. brevinasus *(Emerson & Banks, 1957), comb. n.,* E. chagresi *(Snyder, 1925), comb. n.,* E. heterotypus *Silvestri, 1901), comb. n.,* E. latidens *(Emerson & Banks, 1957), comb. n.,* E. neotenicus *(Holmgren, 1906), comb. n.,* E. silvestrii *(Emerson, 1949), comb. n.,* E. snyderi *(Emerson & Banks, 1957), comb. n.,* E. spissus *(Emerson & Banks, 1957), comb. n., and* E. transandinus *(Araujo, 1977), comb. n., all removed from* Armitermes. *The creation of* Embiratermes, *besides being based on morphological characteristics of soldiers, workers and alates, is justified by the defensive behaviour of the soldiers, which is different from that of* Armitermes *soldiers.* Ibitermes, *gen. n., which seems to be related to* Embiratermes, *includes only* I. curupira, *sp. n., described from a series of soldiers and workers from Brazil. Keys based on the soldier caste are provided for the identification of the 11 genera with mandibulate soldiers of the Nasutitermitinae, and for the species of* Rhynchotermes, Curvitermes *and* Cyrilliotermes. Curvitermes planioculus *Mathews, 1977 is considered a junior synonym of* C. minor *(Silvestri, 1901), syn.n.*

INTRODUCTION

The aim of this paper is to present the results of a research carried on the taxonomy of the genera with mandibulate soldiers of the subfamily Nasutitermitinae. All genera with mandibulate soldiers are found strictly in the Neotropical Region and among them are included the most primitive forms of the subfamily. With the 3 new genera described here the number of genera with mandibulate soldiers is raised to 11, and of genera of Nasutitermitinae to 31 (Araujo, 1977; Fontes, 1983).

The terminology adopted for the parts of the mandibles of the alate and worker castes is that followed by Fontes (1981), except for the fourth marginal tooth of the left mandible, which is named, following Krishna (1968), as the molar tooth. The term head capsule is applied to the head excluding the anteclypeus, labrum, mouthparts, postmentum, antenna, and nose of the soldier. A cylindrical nose is said upturned when its imaginary prolongation intercepts an imaginary line prolonging the lower margin of the head capsule. Measurements are self explanatory; concerning the pronotum of the alates, when its hind margin is incised in the middle, the measurement given does not express the length of the median line, but the total length of the pronotum as if there was no incision.

Universidade de São Paulo, Instituto de Biociências, Departamento de Zoologia, Caixa Postal 20520, 01000 São Paulo, SP. This work received financial support from Fundação de Amparo à Pesquisa do Estado de São Paulo (Proc. 82/0346-4) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (Proc. 40.0499/82).

The names for most taxa described here were derived from Tupi, an Indian language which participated in the formation of the Brazilian idiom.

Key for the genera with mandibulate soldiers of the Nasutitermitinae, based on the soldier caste (passages of this key were inspired on a typed manuscript key generously offered by Dr. Alan E. Mill, to whom I am very grateful).

1. Nose very short, not reaching anterior margin of postclypeus. Mandibles powerful. Usually moderately large to large species 2

   Nose developed, extending well beyond anterior margin of postclypeus. Mandibles variable. Usually small to moderately large species 6

2. Nose very short, projecting little or hardly at all above surface of head. Head with sides converging to front, rarely parallel. Labrum 3-pointed. Antenna with 19-21 articles. Thoracic nota with sides developed into sharp, large spines; in a few cases spines absent, but the sides of the nota conspicuously angulose (see Mathews, 1977, figs. 96-97). Body well sclerotised, dark. Tibial apical spurs 3:2:2 ..... *Syntermes* Holmgren, 1910

   Nose larger. Labrum variable. Antenna with 13-16 articles. Thoracic nota lacking lateral spines or angulose sides. Body weakly sclerotised, whitish to yellowish, abdominal sclerites usually incolor, transparent. Tibial apical spurs 2:2:2 (3:2:2 in a few species of *Procornitermes*) 3

3. Nose short, not reaching base of postclypeus. Labrum without points and with rounded sides; commonly longer than broad. Fora coxa usually with a conspicuous basal projection outside. Index of worker left mandible not lower than 0.7 4

   Nose longer, reaching base of postclypeus but not extending beyond its apex. Labrum with or without points, at most as long as broad. Fore coxa without basal projection. Index of worker left mandible not higher than 0.5 5

4. Teeth of left mandible conspicuous, projecting strongly from inner margin. Fore coxa with a rounded, voluminous basal projection outside ..... *Paracornitermes* Emerson, 1949

   Teeth of left mandible, when present, at most very weakly projected from inner margin. Fore coxa with or without a rounded basal projection outside ..... *Labiotermes* Holmgren, 1912

5. Fore tibia with a row of more than 10 (usually 16-21) internal spines along more than half length of tibia; spines shorter than apical spurs (Emerson, 1952, fig. 3). Apical spurs of tibia 2:2:2. Head, in many species, covered with a dense mat of short bristles (Emerson, 1952, figs. 28-31) ..... *Cornitermes* Wasmann, 1897

   Fore tibia with a row of at most 10 spines inside along apical half; spines about as long as apical spurs (Emerson, 1952, fig. 3). Apical spurs of tibia 2:2:2 or 3:2:2 (in this latter case the outer spur of the fore tibia is smaller than the two inner spurs). Head never with more than a few scattered short to long bristles ..... *Procornitermes* Emerson, 1949

6. Mandibles not extending beyond half length of nose. Nose as long as or longer than the head capsule 7

   Mandibles extending well beyond half length of nose. Nose variable 8

7. Nose upturned, broad and narrowing slightly towards apex, surface smooth. Fore coxa with a prominent, conical or roughly cylindrical, outer projection. Mandibles (Mathews, 1977, figs. 101-103) slender, rounded in section, long and very strongly curved inward, each with an elongated tooth (usually with truncated apex) on

inner margin *behind* curvature; when closed, instead of crossing the left mandible superimposes the right mandible along its whole length, so that the latter, excluding the tooth, lies completely hidden beneath the left mandible and is not visible from above (*R. perarmatus,* from Central America, is the only exception, the very long mandibles crossing and extending sideways). Labrum small; invisible from above when the mandibles are closed, except in *R. perarmatus.* Hind part of pronotum with a large convex lobe on each side; abdominal tergites with a small hump on each side, easily visible from behind ..... *Rhynchotermes* Holmgren, 1912

Nose slender, cylindrical, surface with small rugosities, apex characteristically dilated (figs. 10-15). Fore coxa without external projection as described. Mandibles (figs. 16-18) with very broad base and moderately to strongly curved inward, each with a triangular pointed tooth on inner margin *beyond* curvature (the tooth is vestigial in *C. strictinasus;* Mathews, 1977, fig. 182a); when closed, they cross and both mandibles are thus visible from above. Labrum large, not hidden beneath postclypeus. Hind part of pronotum and abdominal tergites lacking hump at sides .... *Cyrilliotermes,* gen. n.

8. Head capsule rounded. Mandibles slender, strongly curved inward .. 9
Head capsule elongated. Mandibles usually robust 10

9. Mandibles with well developed molar regions (like figs. 16-18). Index of worker left mandible about 2.0 .... *Curvitermes* Holmgren, 1912

Mandibles with less developed molar regions. Index of worker left mandible about 1.0, or lower ..... *Armitermes* Wasmann, 1897

10. Postclypeus strongly inflated and projected forward beneath nose. Mandibles sinuose, without teeth ..... *Ibitermes,* gen. n.

Postclypeus not inflated, almost vertical. Mandibles curved inward and with or without teeth ..... *Embiratermes,* gen. n.

Key to the soldiers of *Rhynchotermes*

Series of *R. diphyes* lacking the major soldier are very difficult to separate from series of *R. nyctobius,* on the basis of the minor soldier only.

1. Mandibles shorter than head capsule and strongly arched inward immediately after middle; marginal tooth broad and shorter than width of nose, apex abruptly truncated. When they close, instead of crossing, the left mandible superimposes the right mandible along its whole length; the labrum, thrusted back by the marginal dentition, hiddens beneath the potclypeus and is not visible from above. South America south of Amazonian forest, in cerrado vegetation 2

Mandibles longer than head capsule and arched inward only near the tip; marginal tooth about as long as the width of the nose and tapering to a pointed tip. When closed, the mandibles cross and extend sideways, overlapping only at the crossing area, the left mandible above the right mandible; the labrum not thrusted back is visible from above. Central America and northen South America, in rain forests ..... *R. perarmatus* (Snyder, 1925)

2. Nose shorter than (or at most as long as) head capsule .... *R. diphyes* Mathews, 1977 (major soldier)

Nose about 1/3 longer than head capsule 3

3. Mandibles strongly curved in the middle, apical third almost straight. Fore coxa with a pointed and roughly conical projection outside. Posterior margin of pronotum not emarginated. In profile, dorsal

line of nose usually forming a distinct angle with the dorsal line of head capsule ..... *R. nasutissimus* (Silvestri, 1901)

Mandibles regularly curved from middle, especially the outer margin. Fore coxa with a blunt and roughly cylindrical projection outside. Posterior margin of pronotum distinctly emarginated. In profile, dorsal line of nose not forming angle with the dorsal line of head, or forming just a weak angle 4

4. Nose weakly downward oriented near opening *R. nyctobius* Mathews 1977
Nose usually straight ..... *R. diphyes* Mathews, 1977 (minor soldier)

Key to the soldiers of *Curvitermes*

I have examined a copy of a manuscript note taken by Dr. A. E. Emerson at Silvestri's laboratory, kindly offered by him to Dr. R. L. Araujo. The note includes a sketch of the head (dorsal and lateral views), and some measurements of the soldier of *C. minor* (Silvestri, 1901). The drawing and the measurements in the note are identical to those presented by Mathews (1977: 230-231, fig. 181) in his original description of *C. planioculus*. For this reason, I propose here that *C. planioculus* Mathews, 1977 is a junior synonym of *C. minor* (Silvestri, 1901), *syn. n.*

1. Marginal tooth on inner side of mandibles not pointing backward. Mandibles longer than half length of head capsule and extending well beyond tip of nose when opened. Nose short, about as long as half length of head capsule, tip rather broad .... *C. projectidens* Mathews, 1977

Marginal tooth on inner side of mandibles pointing backward. Mandibles variable. Nose about as long as 2/3 length of head capsule, tip narrow 2

2. Length of head to tip of nose 1.40-1.54 mm. Mandibles short, about as long as half length of head capsule, and not reaching tip of nose; marginal tooth near base of mandibular blade .... *C. odontognathus* (Silvestri, 1901)

Length of head to tip of nose 1.05-1.22 mm. Mandibles longer than half length of head capsule and extending beyond tip of nose; marginal tooth in the middle of mandibular blade .... *C. minor* (Silvestri, 1901)

Key to the soldiers of *Cyrilliotermes*

1. Head very broad posteriorly in dorsal view, sides strongly converging towards front from about the middle (fig. 14). Mandibles with developed and sharply pointed blades, each with a strong marginal tooth pointing backwards (fig. 18) 2

Head not especially broadened, sides weakly to strongly convex (figs. 10, 12). Mandibles variable 3

2. Nose moderately oriented upward (fig. 15). Suriname *C. cashassa,* sp. n.
Nose strongly oriented upward, so that in profile the dorsal line of the head has a strong concavity at the base of nose (Mathews, 1977, fig. 183). Brazil, State of Mato Grosso .... *C. angulariceps* (Mathews, 1977)

3. Nose strongly oriented upward (fig. 13). Mandibles with developed and sharply pointed blades, each wich a strong marginal tooth pointing backwards (fig. 17). Suriname ..... *C. jaci,* sp. n.

Nose oriented forward (fig. 11). Mandibles with reduced blandes, tips pointed or blunt, marginal tooth not pointing backwards (fig. 16) 4

4. Mandibles with vestigial blades with blunt tips, each with only a small lump intead of a developed marginal tooth on the almost straigth inner margin (Mathews, 1977, fig. 182a) .... *C. strictinasus* (Matheus, 1977)

Mandibles with larger blades with sharply pointed tips, each with a developed marginal tooth on the concave inner margin (fig. 16) ..... *C. cupim,* sp. n.

Cyrilliotermes, gen. n.

Type species: *Cyrilliotermes cupim,* sp. n.

The following species, previously described in *Curvitermes,* are now transferred to *Cyrilliotermes: C. angulariceps* (Mathews, 1977), comb. n., and *C. strictinasus* (Mathews, 1977), comb. n.

Kyrillion: from Greek, a jug with a narrow neck.

Cyrilliotermes are medium sized species which seem to inhabit mainly (or exclusively) mounds built by other termites; they feed on soil or on organic residues in the host termitaria.

Alate. Head with moderately long to long bristles scattered rather sparsely and many very short microscopic bristles, these being recognized by their small sockets paler than ground colour of head (figs. 4, 6, 7, 9; microscopic bristles not represented). Pronotum with moderately long to long bristles as those on head. Wings with many short inclined bristles spacing about equal to their lengths, denser along veins and margins. Tergites and sternites with dense moderately long to long inclined bristles, and one or two rows of longer erect stouter bristles. Fontanelle small, visible as a faint mark a little paler than the surrounding head surface, or obscure, same colour as head. Postclypeus about twice as broad as long, or a little broader, midline visible or obscure and not depressed; in profile (figs. 6, 9), moderately inflated. Eyes large, bulging. Ocelli moderately large to large, broadly oval. Antenna with 15 articles. Mandibles similar to those of worker (figs. 1-3), only the molar plate of the right mandible is a little narrower and the angle between the first and the second marginal teeth is a little wider. Pronotum (figs. 5, 8) narrower than head, more or less trapezium shaped, angles rounded, posterior margin broadly emarginated in the middle (in females of *C. cashassa,* the posterior margin usually has a much broader concave incision in the middle, extending more than half the width of the pronotum). Posterior margin of mesonotum and of metanotum with a broad incision in the middle, either concave or somewhat angular. Each tibiae with 2 apical spurs.

Soldier. Monomorphic. Head capsule rounded to weakly elongated. Nose thin, cylindrical, enlarged only at base and tapering very slightly towards apex, extending well beyond apex of mandibles; surface with small rugosities; apex characteristically dilated and prominent, looks like the apical ring of a bottle of beer (figs. 10-15). Postclypeus not inflated, much broader than long and forming an angle of about 45° with the lower margin of head. Labrum small, oriented forward and visible from dorsum; sides rounded or weakly angular. Fontanelle circular to oval. Mandibles (figs. 16-18) short, reaching about half length of nose; molar regions strongly developed, apical blades slender, toothed on inner margin and strongly arched inwards. Antenna with 14 articles, extending well beyond tip of nose. Pronotum narrower than head; anterior and posterior margins strongly convex. Postmentum short, about as long as broad, strongly inflated, lateral margins not developed into sharp prominences. Legs moderately long, anterior tibia (fig. 26) moderately swollen; coxa with a small and more or less rounded hump at base, outside. Each tibiae with 2 apical spurs.

Worker. Monomorphic. Abdomen voluminous; sclerites and membranes transparent, incolor, with gut contents showing through. Remainder body sclerites whitish to yellowish. Postclypeus moderately inflated. Both mandibles with apical tooth greatly developed, larger than the marginal dentition and with

inner margin concave and longer than the anterior margin of the adjoining first marginal tooth; angle between the apical and first marginals wide; molar regions without ridges. Left mandible (fig. 1): index 2.24; posterior cutting edge of first + second marginal tooth short and concave or fairly straight; third marginal tooth reduced, rounded; molar tooth partially visible between the third marginal tooth and the molar prominence, point hidden beneath the molar prominence; molar prominence large and rounded, projecting well beyond the apex of the third marginal tooth. Right mandible (figs. 2-3): posterior margin of first marginal tooth shorter than its anterior margin; second marginal tooth reduced, forming an obtuse angle with the first marginal tooth, its posterior margin concave; point of second marginal tooth a little closer to the point of the first marginal tooth than to the molar plate; molar plate strongly concave, with rounded notch in basal end, this clearly visible in front and side views.

Comparisons

Cyrilliotermes is very closely related to *Curvitermes,* as indicated by the striking similarities of the mandibles of their alates and workers. The mandibles of *Curvitermes* present slight differences, like a more developed second marginal tooth on the right mandible, and, at least in *C. odontognathus* and *C. projectidens,* a weak convexity in the middle of the posterior cutting margin of the first + second marginal tooth of the left mandible. Also, the thoracic nota of the alate of *Curvitermes* seem to have a shallower incision in the middle of the posterior margin.

The soldier of *Cyrilliotermes* is easily distinguished from the soldier of *Curvitermes,* as well as from soldiers of any other Nasutitermitinae, by its peculiar nose, mandibles, and oblique postclypeus.

Cyrilliotermes cupim, sp. n.
(figs. 1-6, 10-11, 16, 26)

Cupim: the popular name for termite, in Brazil. The term came from Tupi.

Cyrilliotermes cupim seems to be primarily a Cerrado species that has extended its distribution to pastures and other areas previously occupied by forests following the dispersion of the host termitaria (mainly *Cornitermes* mounds) in man-modified habitats from ancient times. Nymphs were found inside colonies from July to September, and alates in November.

Alate (figs. 4-6). Males and females do not differ significantly, even in size. Head capsule brown to dark chestnut-brown; frontal marks and other markings between ocelli a little paler, chestnut-brown; sides of head in front of eyes yellow-brown. Postclypeus yellow-brown. Antenna, bases of mandibles, postmentum, legs and meso- and metanotum brownish-yellow, contrasting with head capsule. Pronotum yellowish-brown, paler in the middle. Wing scales brown to chestnut-brown. Wings pale brown, transparent; costa, subcosta and radial sector brown to dark brown, fading distally to pale brown. Tergites yellow-brown, sometimes a little paler in the middle. Sternites yellow to brownish-yellow, darker at sides, the posterior ones darker at sides, the posterior ones darker, yellow-brown. Epicranial suture visible at rear. Median suture of postclypeus weak but distinct. Fontanelle weakly visible. Longer bristles of head about as long as ocelli width. Membranes of abdomen with scattered very short bristles spacing more than their lengths, a little denser in females; indeed, this character is very discreet for this species: an examined physogastric queen showed no significant increase in the number of bristles on the membranes of abdomen (as is common for other termites), so that the bristles are almost invisible. Head capsule (with eyes) broader than long, hind margin evenly rounded. Eyes very large, subcircular in shape, projecting strongly from sides of head and almost touching ventral margin of head. Ocelli large, bulging, about 1/6 or less of their width from eyes. Antenna with III a little shorter than II and IV which have about the same length. Pronotum with sides fairly straight to weakly convex converging backwards; hind margin

broadly incised in the middle. Posterior margins of mesonotum and of metanotum with a broad concave incision in the middle, points broadly rounded.

Measurements (in millimetres) or 1 physogastric queen (colony nr MZSP 5966) and 5 alates (colony nr MZSP 4491). Total length of queen 20; length of queen abdomen 16; width of queen abdomen 4.3; length of hind wing from suture 9-10; width of hind wing 2.8-2.9; length of head from apex of postclypeus 1.0-1.1; lateral length of head from base of mandibles 0.83-0.96; width of head including eyes 1.26-1.34; height of head excluding postmentum 0.56; length of postclypeus 0.26; width of postclypeus 0.55-0.60; greatest diameter of eyes 0.43-0.46; eyes to lower margin of head capsule 0.01-0.02; ocelli to eyes 0.33; length of ocelli 0.18; width of ocelli 0.13; total length of pronotum 0.60-0.63; width of pronotum 0.10-0.11; length of hind tibia 1.56-1.76.

Indices based on the measured queen and alates. Width of postclypeus/length of postclypeus 2.06-2.25; length of head from apex of postclypeus/length of pronotum 1.63-1.80; width of head including eyes/width of pronotum 1.15-1.30; width of pronotum/length of pronotum 1.63-1.83.

Soldier (figs. 10-11, 16, 26). Head capsule yellow; areas around antennal sockets and near bases of mandibles and noses somewhat darker, brownish-yellow; sides behind antenna darker, brownish-yellow; ventral margin dark brown in side view. Nose pale yellow-brown to dark yellow-brown or brown, in this case contrasting strongly with head capsule. Postclypeus, postmentum, antenna, and palpi of maxilla and labium brownish-yellow. Labrum pale brownish-yellow, apex white. Bases of mandibles yellow-brown to brown, points darker, reddish-brown to dark brown. Pronotum and mesonotum pale yellow to almost white. Legs yellow to yellow-white. Remainder body integument incolor, transparent. Head capsule with scattered long bristles; many very short and hardly visible bristles scattered over head and nose; nose with many short bristles around opening. Postclypeus and labrum with a few long bristles. Pronotum with long bristles around margins. Mesonotum and metanotum with a row of long bristles at sides and rear. Tergites and sternites with many scattered long, shorter and short bristles. Head capsule a little longer than broad; sides very weakly convex behind antenna, posterior margin weakly convex. Nose a little shorter than head capsule excluding postclypeus, not oriented upwards. Fontanelle oval, vertical. Labrum rather short and broad, widest part situated before middle, tip a blunt point. Mandibles (fig. 16): blades reduced and regularly curved inwards, inner margin concave, each with a rather small but distinct pointed marginal tooth not oriented backwards; molar regions well developed, the left one with a strong molar tooth. Antenna with II and V about the same length, longer than III and IV and shorter than VI. Pronotum with a weak incision in the middle of anterior margin, posterior margin without incision.

Measurements (in milimetres) of 10 soldiers from colonies MZSP 5966 and 5984. Length of head to tip of nose 2.10-2.40; length of head to apex of postclypeus 1.40-1.50; length of head to side base of mandibles 1.23-1.40; width of head 1.13-1.28; height of head excluding nose and postmentum 1.00-1.10; length of nose 1.00-1.16; width of pronotum 0.60-0.66; length of hind tibia 1.23-1.36.

Indices based on the measured soldiers. Length of head to tip of nose/width of head 1.85-1.89; length of head to apex of postclypeus/width of head 1.17-1.23; length of nose/length of head to apex of postclypeu 0.72; length of nose/length of head to base of nose 0.80-0.82.

Type material. Specimens are deposited in the Museu de Zoologia da Universidade de São Paulo (MZSP), American Museum of Natural History (AMNH) and author's collection (LRF). BRAZIL. *State of Minas Gerais:* Barbacena (type locality), 31.VII.1975, R. L. Araujo, type colony number MZSP 5966, holotype soldier, paratype soldiers, workers and nymphs and queen, from an epigeous mound at roadside, also with *Labiotermes, Armitermes, Neocapritermes, Anoplotermes* and ants; Belo Horizonte (Pampulha), 28.XI.1956, R. L. Araujo, nr MZSP 4491, alates, soldiers and workers, from a mound uninhabited by the builder, a *Cornitermes* species; 23.VIII.1962, nr MZSP

0043, soldiers and workers; Sete Lagoas, 5.VI.1982, D. J. Domingos, nr. LRF 0314, 3 soldiers from Cerrado; Lagoa Santa, 11.VII.1975, R. L. Araujo, nr MZSP 5984, soldiers and workers, from moist soil round a living trunk and from below the trunk bark surrounded by soil, in Cerrado; Poços de Caldas (surroundings), 14.IX.1967, R. L. Araujo, nr MZSP 0560, soldiers, workers, nymphs and immatures, from a mound of *Cornitermes* at roadside. *State of São Paulo:* São Paulo, 30.VIII.1944, R. L. Araujo, AMNH and nr MZSP 2376, soldiers and workers, from a *Cornitermes* mound with ants; São Paulo (Santo Amaro), 6.I.1945, R. L. Araujo, AMNH and nr MZSP 2709, soldiers and workers, from an abandoned *Cornitermes* mound at roadside; Barueri, 20.VIII.1967, K. Lenko, nr. MZSP 1052, soldiers, workers and nymphs. *Distrito Federal:* Brasília, 18.VI.1971, K. Kitayama, nr MZSP 7022, soldiers, workers and immatures.

Comparisons

C. cupim is very closely related to *C. strictinasus,* the alates of both species being virtually identical, with very large eyes, and large postclypeus and pronotum, and the soldiers having mandibles with rather reduced blades, labrum widest near middle and a similar head shape. *C. strictinasus* alate is a little smaller and paler. The soldier of *C. strictinasus* is a little smaller and paler, with head capsule as long as broad and with more convex sides, fontanelle only slightly oval, and mandibular blades less developed, with blunt apex and just a vestigial tooth on inner margin.

Cyrilliotermes jaci, sp. n.
(figs. 12-13, 17)

Jaci: from Tupi, the moon. An obvious feature of this species is the globous head of the soldier.

C. jaci seems to be a forest species occurring in northern South America.

Soldier (figs. 12-13, 17). Head capsule yellow, only a little darker near antennal sockets and base of mandibles; sides behind antenna somewhat darker, pale brownish-yellow; ventral margin dark brown in side view. Nose pale brownish-yellow. Postclypeus and postmentum pale brownish-yellow. Labrum pale yellow to pale brownish-yellow. Antenna, maxillary and labial palpi and legs yellow. Bases of mandibles yellow to brownish-yellow, points darker, reddish-brown. Pronotum and mesonotum yellow. Remainder body integument incolor, transparent. Head with scattered long bristles and many very short bristles almost unrecognizable under usual (10-50X) magnifications; nose with short bristles round opening. Labrum with a few long bristles. Pronotum with long bristle round margins. Mesonotum and metanotum with a row of long bristles at sides and rear. Tergites and sternites with many scattered medium and long bristles. Head capsule about as long as broad; sides a short distance behind antenna strongly convex; posterior margin strongly convex. Nose about as long as head capsule excluding postclypeus, oriented upward. Fontanelle oval, vertical. Labrum short, narrowed from middle, apex blunt. Mandibles (fig. 17) with blades well developed, abruptly curved inwards and sharply pointed, each with a strong and pointed marginal tooth oriented backwards like the barb of a fish-hook. Antenna with II and V about the same length, a little longer than III and shorter than VI, IV the shortest. Pronotum sometimes with a weak incision in the middle of anterior margin, and with a weak and broad incision in the middle of posterior margin.

Measurements (in millimetres) of 10 soldiers from the type colony. Length of head to tip of nose 1.75-1.90; length of head to apex of postclypeus 1.08-1.15; length of head to side base of mandibles 1.00; width of head 1.06-1.13; heigth of head excluding nose and postmentum 0.93; length of nose 0.96; width of pronotum 0.60-0.66; length of hind tibia 1.03-1.10.

Indices based on the measured soldiers. Length of head to tip of nose/width of head 1.55-1.65; length of head to apex of postclypeus/width of head

1.00-1.03; length of nose/length of head to apex of postclypeus 0.80-0.90; length of nose/length of head to base of nose 0.94-0.98.

Type material. Holotype soldier, paratype soldiers and workers, nr 8266 in the Museu de Zoologia da Universidade de São Paulo. SURINAME. Jodensavanne (Suriname River, about 50 km S Paramaribo), VI.1956-VII.1957, M. A. Knoppe (nr 156), from secondary forest.

Comparisons

The soldier of *C. jaci* is distinguished from those of other *Cyrilliotermes* by its bulbous head capsule, upturned nose and typical mandibles.

Cyrilliotermes cashassa, sp n.
(figs. 7-9, 14-15, 18)

Cashassa: besides its shape, which suggests a bottle, the head of the soldier presents tonalities that remember those of the several kinds of 'cachaça' or 'pinga', the most popular distilled comsumed in Brazil.

C. cashassa seems to be a forest species from northern South America.

Alate (figs. 7-9). Sexual dimorphism occurs in the number of bristles on abdominal membranes and in the shape of the posterior margin of pronotum (see below). Head capsule dark brown, sides in front of eyes a little paler, brown to dark yellow-brown. Antenna yellow. Postclypeus and bases of mandibles yellow-brown. Postmentum brownish-yellow. Pronotum brown, median line paler. Mesonotum and metanotum with anterior half brownish-yellow, posterior half darker, yellowish-brown. Wing scales brown. Wings pale brown, transparent; costa and subcosta brown, fading distally to pale brown; other veins near scales brown to pale brown. Legs yellowish-brown, tibia, darker, brownish-yellow. Tergites brown. Sternites pale brownish-yellow, darker at sides; the posterior ones darker, yellow-brown. Epicranial suture scarcely visible at rear. Median suture of postclypeus obscure, sometimes hardly visible. Fontanelle more or less triangular. Longer bristles on head longer than ocellus width. Membranes of abdomen of male with scattered very short bristles, difficult to see and spacing more than their lengths; in the female, bristles denser, spacing a little more than their lengths and well visible. Head capsule (with eyes) broader than long, hind margin evenly rounded. Eyes medium sized, subcircular in shape, not touching ventral margin of head. Ocelli moderately large, about 2/3 of their width removed from eyes. Antenna with II about as long as III and IV together, III shorter than IV, IV and V about the same length and shorter than VI. Pronotum of male as figured; in the female, posterior margin usually with a much broader concave incision in the middle, extending more than half width of pronotum. Posterior margins of mesonotum and metanotum with a broad, concave incision in the middle, points somewhat rounded.

Measurements (in millimetres) of 10 alates from the type colony. Length of hind wing from suture 8.3-8.5; width of hind wing 2.2-2.4; length of head to apex of postclypeus 0.88; length of head to side base of mandibles 0.80-0.83; width of head including eyes 1.10-1.13; height of head excluding postmentum 0.5; length of postclypeus 0.20; width of postclypeus 0.50; greatest diameter of eye 0.36; eyes to lower margin of head capsule 0.02-0.03; ocelli to eyes 0.06-0.07; length of ocelli 0.13; width of ocelli 0.09; total length of pronotum 0.50; width of pronotum 0.90; length of hind tibia 1.3.

Indices based on the measured alatas. Width of postclypeus/length of postclypeus 2.40-2.50; length of head from apex of postclypeus/length of pronotum 1.65-1.76; width of head including eyes/width of pronotum 1.18-1.26; width of pronotum/length of pronotum 1.70-1.86.

Soldier (figs. 14-15, 18). Head capsule yellow to pale brownish-yellow, areas around antennal sockets and near bases of mandibles a little darker, pale brownish-yellow; sides behind antenna darker, brownish-yellow to pale brown; ventral margin dark brown in side view. Nose pale brownish-yellow to pale brown. Postclypeus yellow to brownish-yellow. Postmentum brownish-

yellow to pale brown. Antenna and palpi of maxilla and labium yellow. Labrum pale yellow. Mandibles with bases yellow-brown to brown, points darker, reddish-brown to dark brown. Pronotum and mesonotum pale yellow to pale yellowish-brown. Legs yellow to yellow-white. Remainder body integument incolor, transparent. Head with scattered long bristles; nose with many short bristles around opening. Postclypeus and labrum with scattered long bristles. Pronotum with long bristles around margins. Mesonotum and metanotum with a row of long bristles at sides and rear. Tergites and sternites with many scattered long, shorter and short bristles. Head capsule a little shorter than broad; sides diverging strongly from antenna to middle region, then slightly convex and parallel, posterior margin convex. Nose shorter than head capsule, slightly oriented upwards and sometimes curving slightly downwards. Fontanelle broadly oval to almost circular, vertical. Labrum short, blunt. Mandibles with well developed blades curved inwards, sharply pointed, each with a strong and pointed marginal tooth oriented backwards like the barb of a fish-hook. Antenna with II and V about the same length, a little longer than III and shorter than VI, IV the shortest. Pronotum with a weak incision in the middle of anterior margin and a weak and broader one in the middle of posterior margin.

Measurements (in millimetres) of 10 soldiers from type colony. Length of head to tip of nose 1.80-1.90; length of head to apex of postclypeus 1.20; length of head to side base of mandibles 1.07; width of head 1.26; heigth of head excluding nose and postmentum 0.86; length of nose (approximate) 0.90; width of pronotum 0.66; length of hind tibia 1.20.

Indices based on the measured soldiers. Length of head to tip of nose/width of head 1.45-1.50; length of head to apex of postclypeus/width of head 0.97; length of nose/length of head to apex of postclypeus 0.72-0.74; length of nose/length of head to base of nose 0.77-0.79.

Type material. Holotype soldier, paratype soldiers, alates and workers, number 8265 in the Museu de Zoologia da Universidade de São Paulo. SURINAME. Jodensavanne (Suriname River, about 50 km S Paramaribo), VI.1956-VII-1957, M. A. Knoppe (nr 119), from secondary forest.

Comparisons

C. cashassa is closely related to *C. angulariceps*. The alates of both species seem to be identical and differ from other *Cyrilliotermes* by the medium sized eyes, short postclypeus and typical pronotum. The soldiers also have many similarities and differ from other *Cyrilliotermes* by the shape of the head, short labrum with blunt tip, and type of mandibles; the soldier of *C. angulariceps* has the nose much more strongly oriented upward than *C. cashassa*.

Cyrilliotermes strictinasus (Mathews, 1977), comb. n.

Curvitermes strictinasus Mathews, 1977: 227-228, alate, soldier.

This species, previously recorded only from the type locality (12°49'S, 51°46'W, State of Mato Grosso, Brazil), has also been collected in Chapada dos Guimarães, State of Mato Grosso, 6-11.II.1976, by R. L. Araujo. The 3 colonies, deposited in the Museu de Zoologia da Universidade de São Paulo under the numbers 6623, 6654 and 6810, each contain soldiers and workers and were collected in Cerrado vegetation or pasture previously occupied by Cerrado, from mounds built by *Cornitermes* and having also *Curvitermes odontognathus* and *Subulitermes microsoma*, as well as species of *Anoplotermes*, *Armitermes*, *Curvitermes*, *Velocitermes*, *Spinitermes* and *Orthognathotermes*, in addition to the builder.

Embiratermes, gen. n.

Type species: *Embiratermes festivellus* (Silvestri, 1901), comb. n. previously in the genus *Armitermes*.

The following species, previously described in *Armitermes,* are now transferred to *Embiratermes: E. benjamini* (Snyder, 1926), comb. n., *E. brevinasus* (Emerson & Banks, 1957), comb. n., *E. chagresi* (Snyder, 1925), comb. n., *E. heterotypus* (Silvestri, 1901), comb. n., *E. latidens* (Emerson & Banks, 1957), comb. n., *E. neotenicus* (Holmgren, 1906), comb. n., *E. silvestrii* (Emerson, 1949), comb. n., *E. snyderi* (Emerson & Banks, 1957) comb. n., *E. spissus* (Emerson & Banks, 1957), comb. n., and *E. transandinus* (Araujo, 1977), comb. n.

Embira: from Tupi, this term means "the one that was born from".

Alate. Postclypeus inflated. Width of postclypeus/length of postclypeus 1.75-2.00. Mandibles similar to those of worker (figs. 19-21), only the molar plate of the right mandible is a little narrower and has a less developed rounded notch in the basal end.

Soldier (figs. 29-39, 25). Monomorphic. Head capsule elongated. Nose conical (it may be narrower and shorter, or a little longer, than in the figure shown), extending well beyond apex of postclypeus but not reaching apex of mandibles. Postclypeus weakly oblique, not inflated (in *E. festivellus* with a weakly developed but distinct swelling on each side) and wider than long. Labrum small, directed forwards and clearly visible in dorsal view of head; sides rounded or, as in *E. chagresi,* weakly angular, apex whitish. Mandibles usually robust, toothed on inner margin (marginal dentition vestigial in *E. heterotypus*); the mandibles, as in *E. chagresi,* may be long, slender and strongly curved inwards, like those of typical *Armitermes.* Antenna with 14 articles, extending beyond the apex of the nose. Pronotum a little narrower than head, raised anterior part commonly narrower at the base than the horizontal posterior part (like in fig. 28). Postmentum long and inflated; anterior third of each lateral margin developed into a more or less sharp ridge. Legs short to moderately long, tibia slender (fig. 25); apical 2/3 of anterior coxa commonly with a small conical projection outside. Each tibia with 2 apical spurs.

Worker. Monomorphic. Abdomen moderately voluminous to greatly voluminous; sclerites and membranes incolor, transparent, with gut contents showing through. Remainder of body sclerites whitish to yellowish. Postclypeus inflated. Both mandibles with apical tooth larger than the marginal teeth and with inner margin concave and longer than the anterior margin of the adjoining first marginal tooth; molar regions without ridges. Left mandible (fig. 19): index around 1.25; posterior cutting edge of first + second marginal tooth sinuate; third marginal tooth reduced but distinct, posterior margin convex; molar tooth partially visible between the third marginal tooth and the molar prominence, point hidden beneath the molar prominence; molar prominence projecting well beyond the apex of the third molar tooth. Right mandible (figs. 20-21): angle between apical and first marginal teeth acute; posterior margin of first marginal tooth longer than its anterior margin; second marginal tooth reduced but distinct, posterior margin weakly concave; tip of the second marginal tooth as close to the tip of the first marginal tooth as to the molar plate; molar plate concave, with rounded notch in basal end, clearly visible in front and side views.

Comparisons

Embiratermes is erected in order to include 11 species previously described in the genus *Armitermes.* The mandibles of the alate and worker of *Armitermes* (as seen in *A. euamignathus* and *A. cerradoensis*) have smaller apical teeth (left mandible index 0.88-1.00) and a much larger second marginal tooth on the right mandible (Mathews, 1977, figs. 161-163). The soldier of *Embiratermes* is readily distinguished by its elongated head. The soldier of *Armitermes* has a rounded head with conical nose extending beyond the apex of the mandibles, mandibles always slender and strongly curved inward, and short postmentum just a little longer than its width and much more inflated, with lateral margins not developed into sharp ridges.

Species of *Embiratermes* move slowly, in this respect contrasting with the typically quick-moving species of *Armitermes;* such fact, connected with the presence of an elongated head capsule and short nose in the soldier of

Embiratermes, and a rounded head capsule and long nose in the soldier of *Armitermes,* seems to be related to differences in the defensive strategies employed by the soldiers of the 2 genera. Concerning *Embiratermes,* Mathews 1977-220) reported that the soldiers of *E. neotenicus* "...are rather slow moving; they normally stand at an opening in the nest with their mandibles and nasus facing outward. If anything approaches them, they emit a highly volatite fluid... from the nasus and may emerge to give a very effective bite with their large, needle sharp mandibles, easily drawing blood from a finger". According to my personal observations, a similar behaviour is shown by the soldiers of *E. festivellus* and *E. heterotypus,* as well as by the mandibulate soldiers with similarly elongated heads of other Nasutitermitinae (*Paracornitermes* and *Cornitermes,* at least), when their nests are disturbed; no soldier leaves the nest, but just remains at the opening, usually with only the head visible from the outside, until the workers seal the exposed galleries. The described behaviour can be suppressed under unusual circunstances, as for the nuptial flight of *E. heterotypus,* when, besides the alates, the soldiers and workers also leave the subterranean nests by means of galleries opening in the ground surface and spread in the open over a circle of about 20 cm in diameter around the opening. On the other hand, when a nest of *Armitermes euamignathus* is damaged, the soldiers, instead of remaining around the opening with their bodies inside the galleries, leave through the breach and remain outside at the surface of the nest, there looking (or waiting) for the aggressor for some time.

Ibitermes, gen. n.

Type species: *Ibitermes curupira,* sp. n.

Ibi: from Tupi, earth or soil.

Alate. Unknown.

Soldier. Seems to be monomorphic, but only 8 specimens were available for study. Head capsule elongated and almost glabrous. Nose conical in dorsal view, extending well beyond apex of postclypeus; profile characteristic (fig. 32). Postclypeus remarkably inflated, convex and strongly projected forward between bases of mandibles; more or less triangular in dorsal view and hemispherical in profile; wider than long in dorsal view. Labrum small, sclerotised, oriented downward and hidden by the postclypeus in dorsal view; sides rounded. Mandibles sinuate, very enlarged at base and without teeth; points projected inwards. Antenna with 14 articles, extending beyond tip of nose. Postmentum elongated, moderately inflated; anterior half flattened, each lateral margin developed into a more or less sharp ridge; posterior half weakly convex. Pronotum a little narrower than head; raised anterior part well developed, base quite narrower than the horizontal posterior part (fig. 28). Legs long, tibia slender (like in fig. 25). Each tibia with 2 apical spurs.

Worker. Monomorphic. Abdomen oval; sclerites and membranes incolor, transparent, with gut contents showing through. Remainder of body sclerites whitish. Head with scattered very short bristles and a few long bristles. Chaetotaxy of thoracic and abdominal sclerites similar to that of soldier. Postclypeus moderately inflated. Width of postclypeus/length of postclypeus 2.27-2.43. Both mandibles with apical tooth larger than the marginal teeth and with inner margin concave, longer than the anterior margin of the adjoining first marginal tooth; angle between the apical and first marginals wide; molar regions without ridges. Left mandible (fig. 22): index 0.93; posterior cutting edge of first + second marginal tooth weakly sinuate; third marginal tooth developed, rounded; molar tooth partially visible between the third marginal tooth and the molar prominence, point hidden beneath the molar prominence; molar prominence large and rounded, projecting well beyond the apex of the third marginal tooth. Right mandible (figs. 23-24): posterior margin of first marginal tooth a little longer than the anterior margin; second marginal tooth reduced to a broad rounded projection midway between the

first marginal tooth and the molar plate, forming an obtuse angle with the first marginal tooth; posterior margin of second marginal tooth concave; molar plate strongly concave, and with rounded notch in basal end, clearly visible in front and side views.

Comparisons

The worker mandibles related *Ibitermes* to *Labiotermes, Embiratermes* and *Armitermes* (figs. 19-24; Mathews, 1977, figs. 160-163). The soldier, however, although superficially similar to those of *Embiratermes,* exhibits remarkable features with no similar in the soldier of any other Nasutitermitinae, like the monstrous postclypeus and the sinuous and untoothed mandibles. Thus, although it may be related to *Embiratermes,* the exact relationships of *Ibitermes* and the remainder genera of the Nasutitermitinae is still obscure.

Ibitermes curupira, sp. n.
(figs. 22-24, 27-28, 31-32)

Curupira: the curupira is a mythic boy with hairy body, long red hairs, and feet directed backwards. This creature is a god of forests, protector of hunting animals.

Soldier (figs. 27-28, 31-32). Head capsule yellow to pale brownish-yellow, a little darker at the base of the nose and in the vicinities of the postclypeus. Nose, postclypeus and bases of mandibles brownish to yellowish-brown; nose a little darker. Postmentum yellow. Labrum brownish. Mandibles (except bases) dark reddish-brown to brown, apex darker, almost black. Bristles of head as figured. Pronotum with 6-8 long bristles on anterior margin, 8-10 subapical ones on posterior margin, and 5-6 bristles on surface. Mesonotum and metanotum with long bristles on posterior margin; metanotum with a few long bristles on disc. Tergites and sternites with many long bristles roughly lined up in 3 transverse rows; some bristles on the posterior half of each sternite are longer and, although erect, are orientated forward. Head capsule with sides weakly convex, posterior margin convex. Nose about half length of head capsule excluding the postclypeus, not reaching apex of mandibles and not oriented upwards. In profile, lower margin of head capsule and of nose about paralell. Antenna with articles II, III and V about the same length, IV a little shorter than V, VI-XIV a little longer and thicker. Anterior margin of pronotum deeply incised in the middle, posterior margin convex except in the middle, where it is almost straight. Anterior coxa without hump outside.

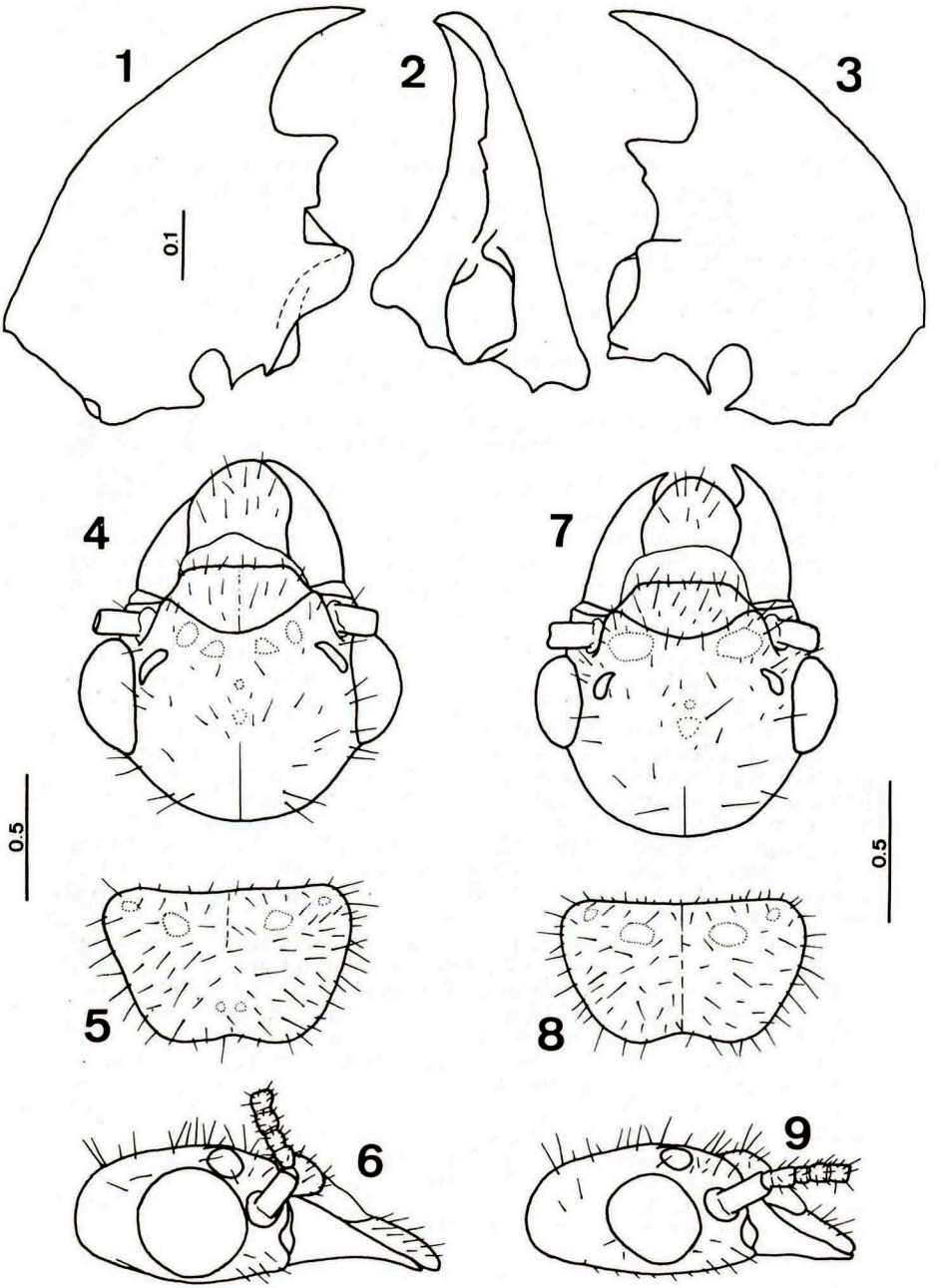
Measurements (in millimetres) of the 8 soldiers from the type colony. Length of head to tip of nose 3.23; length of head to apex of postclypeus 2.20-2.37; length of head to side base of mandibles 2.33-2.40; length of nose 1.07; width of head 1.90-2.00; height of head excluding nose and postmentum 1.36-1.47; width of pronotum 1.20; length of hind tibia 1.43-1.48.

Indices based on the measured soldiers. Length of head to tip of nose/width of head 1.61-1.70; length of head to apex of postclypeus/width of head 1.16-1.18; length of nose/length of head to apex of postclypeus 0.38-0.40; length of nose/length of head to base of nose 0.46-0.48.

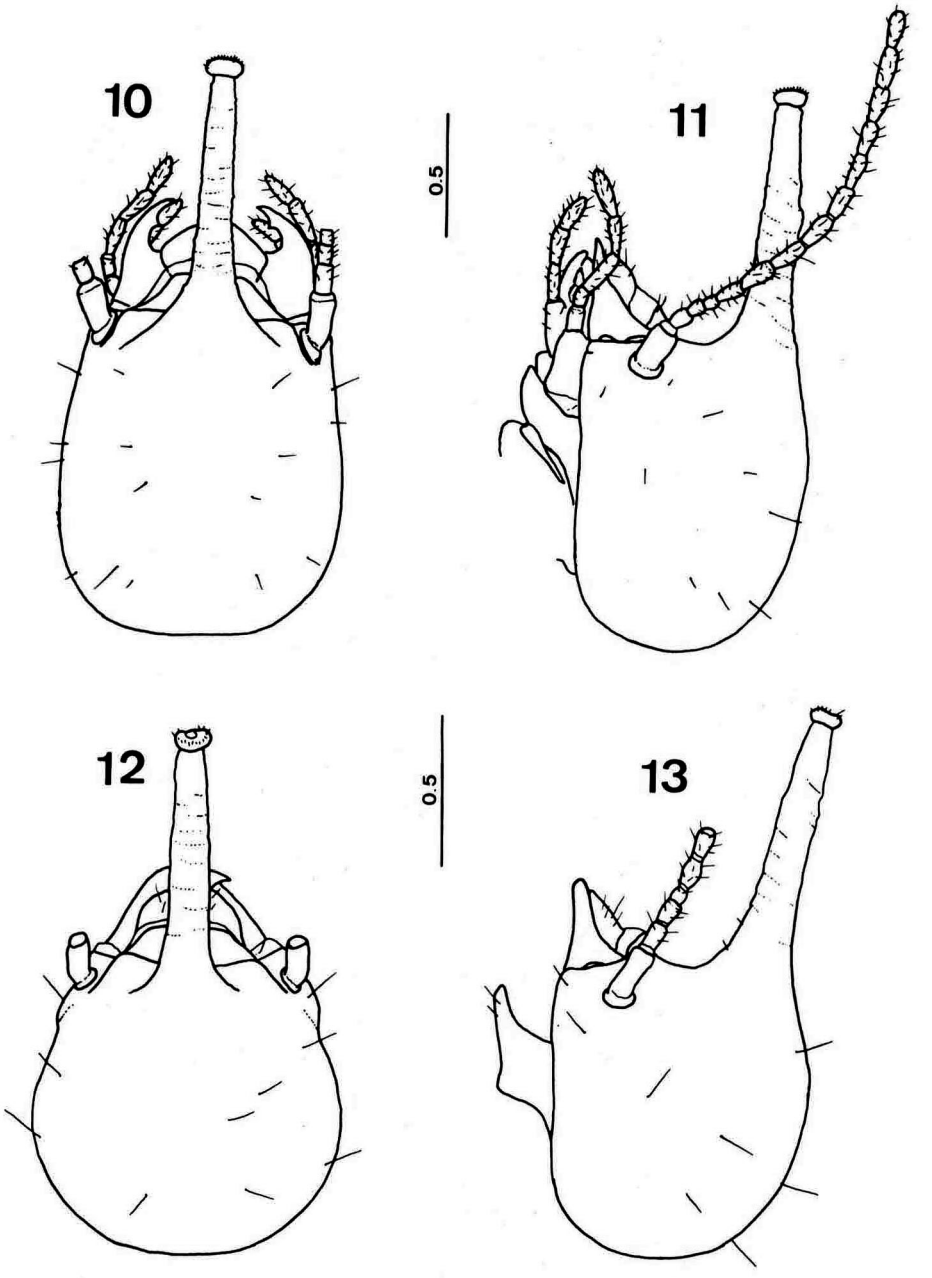
Type material. Holotype soldier, 7 paratype soldiers and workers in the author's collection under number 0313. BRAZIL. *State of Minas Gerais:* Itabira, 14.I.1983. M. A. Drumond, from an earth mound in a *Pinus elliotti* plantation of Companhia Vale do Rio Doce.

ACKNOWLEDGMENTS

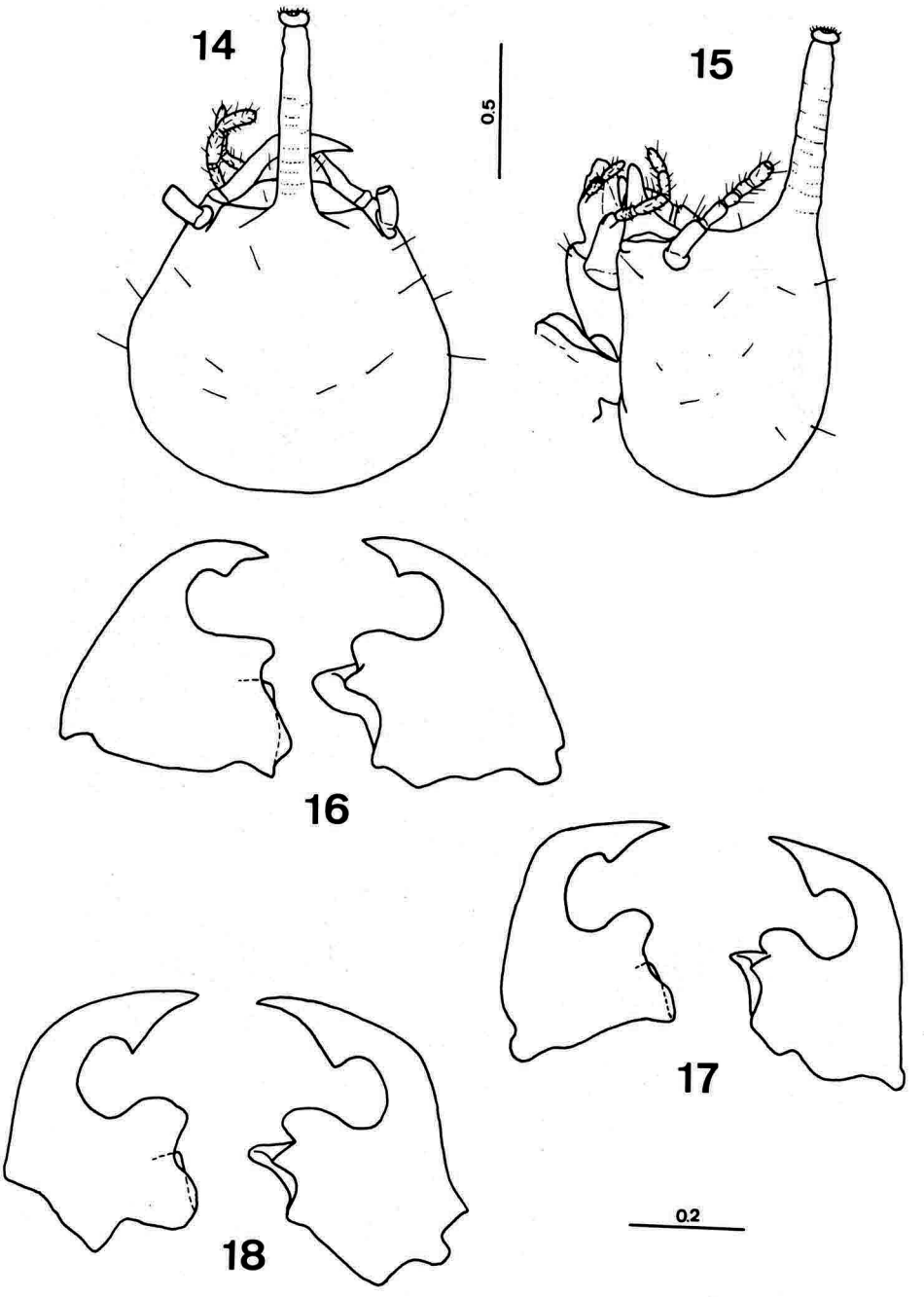
I am grateful to Dr. Francisca C. do Val and Dr. José H. Guimarães, and to Dr. Denise J. Domingos and Miss Maria A. Drumond, for providing specimens of the collections of the Museu de Zoologia da Universidade de São Paulo and Instituto de Biologia da Universidade Federal de Minas Gerais, respectively. My thanks are also due to Dr. Nelson Papavero and Dr. Solange M. F. Ribeiro, for the critical reading of the manuscript.



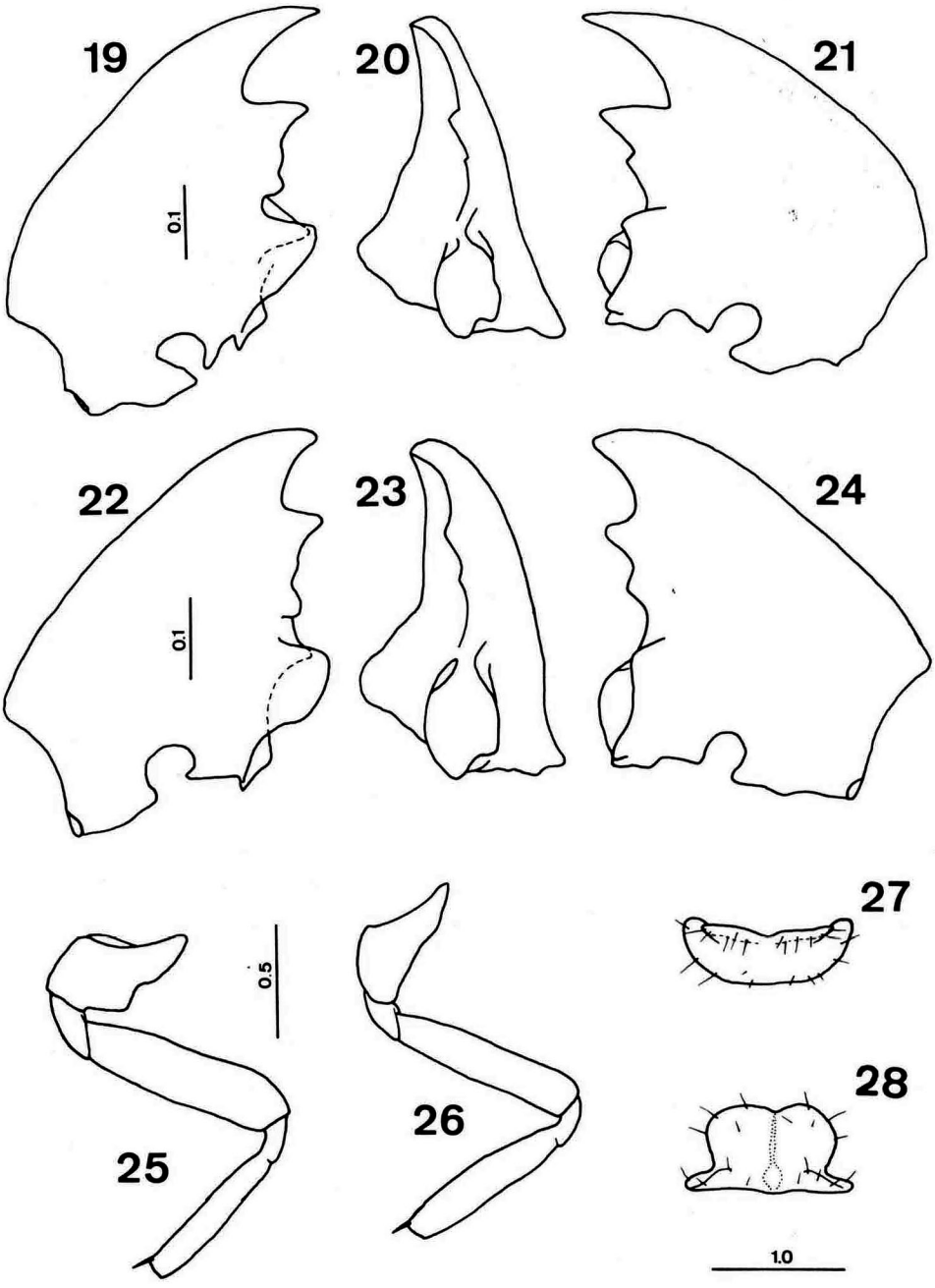
Cyrilliotermes cupim, worker: 1, left mandible; 2-3, right mandible. *C. cupim*, alate: 4, head, dorsal; 5, pronotum, dorsal; 6, head, lateral. *C. cashassa*, alate: 7, head, dorsal; 8, pronotum, dorsal; 9, head, lateral. Worker of *C. cupim* from Barbacena, and alate from Belo Horizonte, Brazil. Alate of *C. cashassa* from Jodensavanne, Suriname. Scales in millimetres.



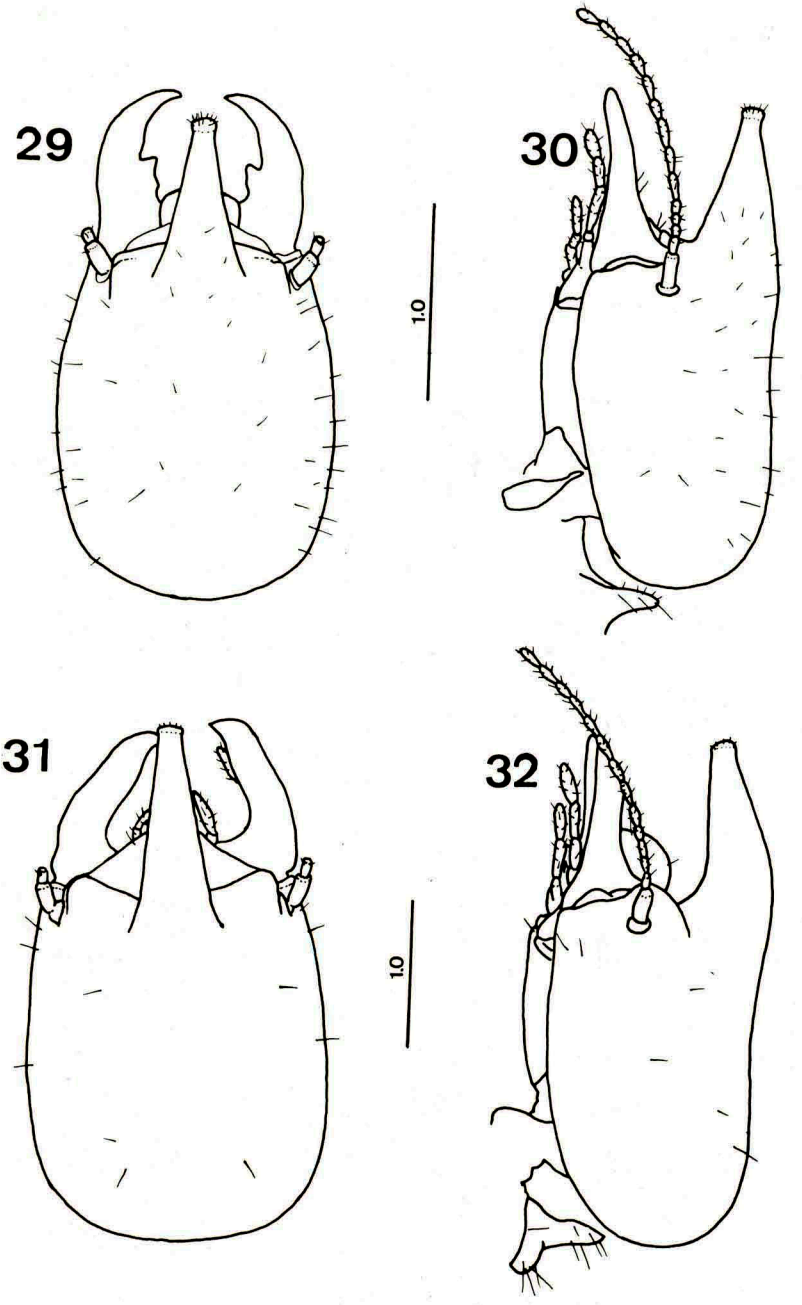
Cyrilliotermes cupim, soldier: 10, head, dorsal; 11, head, lateral. *C. jaci*, soldier: 12, head, dorsal; 13, head, lateral. Soldier of *C. cupim* from Barbacena, Brazil; of *C. jaci* from Jodensavanne, Suriname. Scales in millimetres.



Cyrilliotermes cashassa, soldier: 14, head, dorsal; 15, head, lateral. Mandibles of soldiers, in ventral view (the right one is in the left side, and vice versa): 16, *C. cupim;* 17, *C. jaci;* 18, *C. cashassa.* Soldiers of *C. cashassa* and *C. jaci* from Jodensavanne, Suriname; of *C. cupim* from Barbacena, Brazil. Scales in millimetres.



Embiratermes festivellus, worker: 19, left mandible; 20-21, right mandible. *Ibitermes curupira*, worker: 22, left mandible; 23-24, right mandible. Right fore leg, soldier: 25, *E. festivellus;* 26, *C. cupim.* Pronotum of *I. curupira*, soldier: 27, dorsal view; 28, viewed from behind. Specimens of *E. festivellus* from Araxá, of *I. curupira* from Itabira, and of *C. cupim* from Barbacena, Brazil. Scales in millimetres.



Embiratermes festivellus, soldier: 29, head, dorsal; 30, head, lateral. *Ibitermes curupira,* soldier: 31, head, dorsal; 32, head, lateral. Soldier of *E. festivellus* from Araxá, and of *I. curupira* from Itabira, Brazil. Scales in millimetres.

REFERENCES

Araujo, R. L., 1977. *Catálogo dos Isoptera do Novo Mundo.* Academia Brasileira de Ciências, Rio de Janeiro, 92 pp.

Emerson, A. E., 1952. The Neotropical genera *Procornitermes* and *Cornitermes* (Isoptera, Termitidae). *Bull. Am. Mus. nat. Hist. 99*: 477-539.

Fontes, L. R., 1981. *Caetetermes taquarussu,* a new genus and species of Ecuadorian nasute (Isoptera, Termitidae, Nasutitermitinae). *Revta bras. Ent. 25*(2): 135-140.

Fontes, L. R., 1983. Acréscimos e correções ao "Catálogo dos Isoptera do Novo Mundo". *Ibid. 27.*

Krishna, K., 1968. Phylogeny and generic reclassification of the *Capritermes* complex (Isoptera, Termitidae, Termitinae). *Bull. Am. Mus. nat. Hist. 138*: 261-324.

Mathews, A. G. A., 1977. *Studies on termites from the Mato Grosso State, Brazil.* Academia Brasileira de Ciências, Rio de Janeiro, 267 pp.